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ABSTRACT

The natural sign language used by deaf children in Poland makes no distinction between present, future, and past tenses. Deaf pupils do not understand the notions of temporal sequence and duration of time intervals, and so are prevented from thinking of and planning for the future. The study with 15 deaf 12-year-old pupils and 15 deaf 14-year-old deaf pupils in Poland examined their understanding of the following time concepts: perception of the age of adults, chronology of historical facts and the problem of temporal perspective, understanding of the relations between generations in a family, and the ability to use temporal notions. It was concluded that poor time concepts among deaf children probably do not result only from language defects. (Author/PB)

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THE UNDERSTANDING OF TIME BY DEAF PUPILS

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Abstract

One of the serious difficulties that complicate the education of deaf children is the problem of their understanding of time and related concepts. To be sure, children who can hear and speak normally find it a difficult task, too, to understand, for instance, the relationship between time and velocity, or the inclusion of one time interval within another; they are also hard put to it to overcome the tendency to adopt spatial ordering as the chief criterion when presenting a sequence of events. In due time, however, children surmount these barriers, learn to use historical or prehistorical time; at a later stage they become capable of understanding sidereal time. Finally the moment comes in their education when time is explained to them in terms of relativity theory. In the present age of science fiction literature and films, some understanding--be it even crude and superficial--of the riddles or relativity is a must for a person willing to enjoy these forms of entertainment.

On the other hand, the way pupils from the special school for the deaf behave and the questions they ask--younger and older pupils alike--suggest to us that their understanding of time and related concepts is usually inadequate and incomplete, and often virtually non-existent. First of all, deaf pupils do not understand the notions of temporal sequence and duration of time intervals. The natural sign language used by deaf children in Poland makes no distinction between present, future, and past tenses. There are just signs for such simple expressions as now, later, a long time ago, today, tomorrow, the day after tomorrow, yesterday, etc. When children are asked questions like, "What were things like a hundred years ago?" they answer in accordance with the notion of time intervals they possess--"There was a war," "It was a long time ago," It's history." Thus, we should not be surprised when teachers are asked by their 15-year-old deaf pupils such questions as, "Did you know Copernicus? Did granny know him?"

The concepts we have begun to investigate in deaf pupils from the senior grades include, among other things, perception of the age of adults, chronology of historical facts and the problem of temporal perspective, understanding of the relations between generations in a family, and the ability to use temporal notions.

Although what deaf children say or write may occasionally provoke laughter, the results of the tests carried out so far, e.g., a written composition on the children's vision of their own future, are anything but optimistic. It appears that the paucity of means of verbal expression, together with the lack of a sense of time, prevents deaf children from thinking of and planning the future; the children feel no incentive to visualize their future, dream about it, or try to make such dreams real.

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From among the concepts to be investigated that are listed above, we have concentrated first of all on the deaf pupil's understanding of notions related to time as this understanding seems of utmost importance for the proper functioning of the individual in society.

Introduction to the Problem

A contemporary man, according to Edward T. Hall (1987), has an inclination to think about time as something inherent in nature, something surrounding us, and inescapable; time is an everlasting element of the environment like the air that we breathe.

In addition, time is also as important a part of the culture of a given society as language is a bearer of information about the society. It is even treated as a specific means of communication between people. People's subjective attitude to time, its economy and apprehension changed depending on the century, latitude, or the advance of civilization. Sciences also used to alter their definitions of time. In classical Newtonian mechanics, time and space were absolute values, while velocity expressed only the relationship between them. On the other hand, in relativistic mechanics, velocity is an absolute value, while time and space are derivatives. Time ceases to be unequivocally conceived of and falls into several independent notions. As a result of this methodological ambiguity the interrelationship of time and consciousness escapes the rules of scientific examination.

The views adopted about time fall under three major categories:

a. According to idealistic ideas, time is nothing but a product of the subject's mind, and as such it is totally dependent on the subject;

b. According to the realistic concept, time is a real, self-sufficient entity consisting of objective events; and

c. Unlike the above two, relational concept considers time to be the mind's creation, which persists totally subject to objective events (Zwart, 1976).

The third concept, the psychological one, deserves particular attention; according to it, the passage of time is a specific way of experiencing the sequence of events. The sequence relationship, or the assertion that one event is prior to the other, depends on the subject who perceives the events: time depends on both the subject's mind and the objective events. Psychological treatment of time lays emphasis on the mind, though the mind's role is scrupulously ignored in physics. Thus, the psychological treatment of time has certain specific features, and it can hardly be reduced to or reconciled with other ways of dealing with the problem.

In psychology, the problem of time focuses upon the experience of the past, present, future, simultaneousness, and duration. It is also possible to divide the question of time into two complementary concepts: a) time as an order of events or as relation of the type, "now, earlier, later," and b) time as duration or as the experience of the measure of time.

It is through education that the orientation in time, mastering the fundamentals of the time system and its complicated subtleties are acquired. Educationalists claim that children need about twelve years to grasp time concepts; they will then know how, generally, our fundamental time system works, but will not master its details completely. Children who can hear and speak for a long time have many troubles in understanding the relationships between time and velocity, or inclusion of one duration time in another. It is also difficult for them to overcome the tendency to present the sequence of phenomena so that it agrees with the order of spatial sequence. In the course of development, however, they surmount the barriers, start to use historical and prehistorical time; when older, they comprehend the so-called sidereal time. Finally, a moment comes in their education when time is explained to pupils in terms of relativity theory. In the age of science fiction, some understanding or acquaintance, but it very

superficial and simplified, with the riddle of relativity is a must for a person willing to enjoy these forms of entertainment.

However, in a special school for the deaf, both the younger and older pupils' questions and behaviors indicate that their understanding of time and related concepts is generally inadequate, incomplete, and often virtually nonexistent. This fact not only seriously complicates the teaching process, but also disturbs the adequate social functioning of the children.

When creating a specific means of communication, the deaf subculture had to take into account signs representing time, it influence and cyclic character. Yet, a conventional sign rendering the sender's information to the receiver often lacks deeper meaning for both of the hard-of-hearing persons taking part in the interaction. In their everyday experience, teachers observe the inability of deaf pupils to abandon in their thoughts the "here and now" for the sake of different time, even if they are referring to important events in their childhood. The hard-of-hearing child's time is included in a general category of unreality.

The lack of grammatical tenses in natural sign language used by Polish deaf children does not reflect the lack of time awareness.

Even in cultures in which no clear conceptualization of time may be encountered, the awareness of time does exist (Whitrow, 1979).

Consequently, we should answer the question, "What kind of intuition lies behind the time concepts created by deaf children?"

For the understanding of distant time relationships, historical events, and causal connections, it is necessary to create the sense of historical time. It is not actually experienced time, but an abstract category whose creation necessitates an understanding of time experienced here and now. Thus, the time being experienced is primary to historical time, which is

secondary. Secondary time cannot appear in the child's mind before the primary time is crystallized. Mistakes in understanding the latter lead us to the conclusion that there is no feeling of historical time or that the created concepts are inadequate.

In the adopted two-level model of time, the primary level consists of the following categories:

1. Understanding and feeling of cyclic flow of time that evolved culturally, e.g., the division of a day according to meals or other fixed activities, year division into study and holidays, etc.
2. The feeling of time flowing in accordance with measurable time units, as those used in a clock or a calendar.
3. Ability to move from "here and now" to the past and to the future.
4. Understanding the inclusion of one duration time in the other, e.g., older/younger relationships, grasping generation connections in a family.

Although the first two categories are based mainly on learning and memory, the remaining categories are intuitionally shaped in the child's mind and are marked by high individualism.

The first stage of our investigations accounted for in the present paper consisted in the evaluation of deaf pupils' understanding of those temporal concepts that function within the third category of primary time.

The Subjects, Methods, and Results

Developmental psychology teaches that the better a child grasps the terminology related to time, the better it understands time. However, broadening the temporal horizon forward and backward depends equally on the knowledge of terms and on the child's individual experience.

Embarking on the investigation of twelve-year-old pupils (sixth-graders) from the Special School for Deaf Children in Crakow, we assumed that the level of their experience and command of language would guarantee reasonably appropriate understanding and application of time concepts on the primary level. The choice of this very age group (ages 12;00-12;9) was also affected by the above-mentioned developmental and educational statement that children of twelve are able to grasp the fundamental concepts and principles of time system. All children had deep hearing defect (below 80 dB) and normal intellectual development. The control group consisted of hearing sixth-graders from Primary School No. 145 in Crakow. The groups consisted of 15 persons each. Considering the unsatisfactory results obtained by the deaf children, we included in the later part of the experiment 15 eighth-graders from two forms of the School for the Deaf (age 14;2-15;0). The children taking part in the experiment answered 13 sample questions presented in a written form and also translated into sign language to each of them. "What are you doing now?" was the initial question, which will be analyzed later; then six questions referring to the nearer or more distant past followed; the next six questions referred to nearer and more distant future; however, each time, both in past in future, the questions were asked after events in the similar time intervals.

0. What are you doing now?
1. What were you doing in the morning?
2. What were you doing yesterday?
3. What were you doing in July?
4. What did you do in 1987?
5. What did you do in the third grade?
6. What did you do in kindergarten?

7. What will you be doing at 13:00?
8. What will you be doing in the evening?
9. What will you be doing tomorrow?
10. What will you do in December?
11. What will you do in 1989?
12. What will you do when you are grown up?

Among the deaf sixth-graders there were none who could answer all the questions correctly, in spite of the fact that we adopted very liberal criteria (we did not take into account grammatical errors in the formal construction of sentences in past future tenses). The pupils gave from three to seven incorrect answers.

The number of errors was almost identically distributed between the group of questions referring to the past and the group of questions referring to the future.

We noticed that two questions posed particular difficulty: "What did you do in 1987?" and "What will you do in 1989?" The pupils did not have problems with moving further backward to kindergarten or forward to adulthood; nevertheless, appealing to a concrete date posed a problem to them and many a time they did not answer at all. Most probably the following mechanism was resorted to here. The word (or sign) "kindergarten" is associated with playing; on the other hand, the term "grown-up" is associated with work. Actually, all the children gave, perhaps not identical, but very similar answers--that in kindergarten they had played and when they are grown up they would work. Thus, the answers were evaluated positively; however, when a question referred to a concrete date, it forced the subject to abandon that schema and common associations and give a fact that would differentiate this year from others, and this turned out to be too difficult a task. Only one out of the 15 pupils gave

an answer referring to a concrete extraordinary even in the past: "In 1987 year I went to the falls." Nine persons gave incorrect answers of the following kind: "In 1987 was long ago," or "In 1989 is a New Year"; the rest (five children) gave correct but schematic answers such as in the case of questions about kindergarten and adulthood: "In 1987 I did to school," "In 1989 I will learn."

Hearing children from the control group did not reveal any difficulties. All of them performed all the tasks correctly; in questions about concrete dates they gave abundant descriptions of experienced events from the past or they planned the future precisely and imaginatively, e.g., "In 1987 I thought about installing an aquarium," "in 1989 I will probably be 10 cm taller and I may start practicing basketball."

In order to find out at what age deaf children answer all questions correctly, we presented the questions to the eighth-graders, i.e., from the last grade of the primary school. Only two pupils answered the whole questionnaire correctly; the rest committed fewer mistakes (three at the most) than the sixth-graders, but the same questions concerning concrete dates caused difficulties of the same kind. This suggests that hard-of-hearing children, even 14- to 15-year-olds, do not use fully use concepts on the primary level.

It seemed astonishing that both sixth- and eighth-graders revealed problems in answering the question, "What are you doing now?" The fact is that the word "now" does not indicate precisely what time interval is meant, but it is useful for defining the duration moment of the activity performed directly and observed. Its high frequency in everyday language conditions, makes deaf children well-acquainted with this concept. The children perfectly understand the instruction, "Have dinner now," or "Bring some chalk," etc., but only 20% of those under investigation gave correct answers of the type, "I am writing now," or "I am at school now." We

may assume that the difficulty which we noticed resulted not from their incorrect concepts, but from their lack of ability to "see" themselves in the act of performing something, because it requires abandoning a certain schema in thinking about oneself. Their answers of the type: "I watched TV now", "They went home now", and "Now a girl play" indicate that the children found it much easier to speak of past events than to describe their present actions.

All hearing pupils from grade VI answered the same question as follows: I am writing, answering, filling in the questionnaire.

Owing to the ability of experiencing oneself doing something, the present tense, really experienced, is also directly observable. However, in spite of this fact, deaf children were unable to function correctly within this time concept.

To sum up the results of the first stage of our experiment, we can say that both 12-year-old and older children experienced serious difficulty correctly using simple time concepts. We graded answers very leniently; the children could answer either in sign language or in writing, and we tolerated grammatical mistakes, yet we were surprised by both a large proportion of incorrect answers and by the fact that correct answers were scant and schematic. Even the children who chose to answer in sign language, which suits them better, did not demonstrate any originality, fantasy, or imagination. Their statements were also brief and frequently incorrect.

The question is: was it caused by the children's limited language skills or by some other factors? In order to reduce as much as possible the role of language in researching the ability to shift from the present to the past and the future, we used the method which had the following graphic form:

Three dates had been marked on the time axis: the date of examination--the central point, the pupil's birthdate, and the year 2000. The points divided approximate 12-year-long time intervals reaching into the past and the future. The pupils were asked to assign several concrete events to some points on the time axis.

Assigning events to the two points in the past was less difficult for the deaf pupils than imagining something in the future. In spite of the investigator's suggestion that any number of events from the past going beyond the date of birth might be assigned, the pupils were satisfied with describing only one point. They either assigned facts taking place in the immediate family or among friends (mom's, grandma's, teacher's birthday) and seldom assigned historical events, such as the Second World War, because during lessons it is frequently referred to as an element from the past. Younger pupils, when asked what was earlier, answered "I did not see

it," "It was long ago," "This is history." Similarly, out of 15 eighth-graders, only three pinpointed a concrete event from Polish history along with the date.

It was much harder for the deaf to go to the future. They could not present their plans and dreams either verbally or in sign language, unlike the hearing children who presented surprisingly ingenious and colorful descriptions. Hearing twelve-year-olds predicted in the near future, for instance, flights to the sun, a cure for cancer, and computerization of the world. On the other hand, there were no such answers separate from personal matters among the deaf subjects. Hard-of-hearing children made us of a schematic life plan reducible to such stages as marriage, work, retirement, and death.

This alarming poverty of imagination should be signal for the teachers to undertake measures in the education of the deaf against application of methods mainly based on imitation and repetition. Though necessary, the methods cannot be the only ones to be used, for they otherwise have a negative influence on the development of original creative thinking, initiative, and imagination.

To sum up the second stage of our experiment: firstly, the difficulty which deaf children experience in shifting into the past is connected with their limited imagination, as its development depends indirectly on language and proceeds mainly by reading children's books, listening to fairy tales and retelling dreams. Secondly, in corroboration of our theoretical assumptions, the pupils under investigation who were unable to grasp the concept of primary time, could not develop any structures of historical, secondary time.

What should be further explained is the fact that deaf children remember so little from their own past. The following explanation seems plausible: hearing children come to remember events from their childhood because their parents or other adults in the family tell them over

and over again, "When you were little..." etc. Deaf children cannot remember events from their past with the parents until the age of six because of the language barrier, and when they go to school as boarders (as a large majority of them do), they cannot remember their past with the people they live with as they do not know the children's past.

Summary

The investigations presented confirm the conclusion that deaf twelve-year-olds, as well as 14- and 15-year-olds, make a number of essential mistakes as regards the adequate application of time concepts. They have serious difficulties in verbal description of time phenomena, and we should remember that language, in addition to individual experience and intuition, is one of the creating factors in the shaping of time understanding. However, inappropriately shaped and ill-functioning time concepts among deaf children do not result only from language defects. We should bear in mind that time experience consists also in ordering events in a sequence and other studies conducted in the Institute of Psychology of Jagiellonian University prove that the development of the sequential ordering processes in hard-of-hearing children is seriously retarded, which may have a disturbing influence on their understanding of time phenomena.

Delaying too late the rehabilitation of small children with hearing defects is the third factor responsible for the present situation. In the Polish system of children's rehabilitation, young patients going to a Clinic for Deaf Children do not have a sufficient knowledge of fundamental concepts, including those referring to time. This obligation has to be taken over by the school, whose educational program (which introduces the teaching of particular subjects, i.e., history, only in the fourth grade) does not give the children enough opportunity to shape and strengthen the use of primary concepts.

Our investigation plans include further research on the understanding and functioning of time concepts that form the fourth category of primary time, and later we will also deal with secondary time (in senior deaf pupils).

At the present stage of the study, it would be interesting to compare our remarks with the observations of American hard-of-hearing children whose education is based on principles and methods different from Polish ones.

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